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(54) Method for making a laundering tube for a laundry washing machine and laundering tub thus made.

(57) A method for making a plastic laundering tub for a laundry washing machine, in which said tub (5) is adapted to contain a rotatable drum (10) supported by bearings (12,13) mounted in a sleeve (14) passing through a respective end wall (8) of the tub. The method is characterized in that the sleeve (14) is made separately from the tub (5) by injection-moulding of a plastic material having a high resistance against mechanical stresses in two successive moulds (16, 20), and that the sleeve (14) is subsequently placed into a third mould (26) for injection-moulding thereabout another plastic material having a lesser resistance against mechanical stresses than the previous one for thus finishing the tub (5).

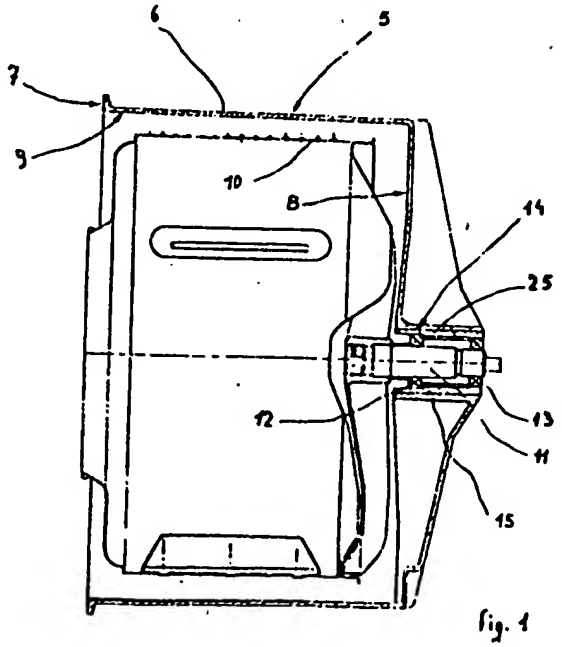

fig. 1

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Description

The present invention relates to a method for making a laundering tub of a plastic material for a laundry washing machine, and to a laundering tub made by such method. Already known is a plastic laundering tub for a laundry washing machine (Italian Utility Model No 162,401), this tub being integrally formed with a respective end wall carrying at least two bearings for supporting the shaft of the drum of the machine. The bearings are maintained at axially spaced positions by a metal sleeve interposed therebetween. Also known (from European Patent No.0043429) is a plastic laundering tub made in one piece as in the preceding case, an end wall of this tub carrying a metal sleeve formed with seats for the bearings mounting the shaft of the drum of the laundry washing machine. These tubs offer the advantage of being economically obtainable of an inexpensive plastic material in a single injection-moulding operation.

On the other hand it has been found in practical use that the first type of the tub described above is particularly critical adjacent the locations of the support bearings for the drum shaft during rotation of the drum.

Under these conditions the bearings are subjected to considerable mechanical stresses tending to progressively deform the material of the tub adjacent the locations of the bearings.

The tubs of the second type described require the seats for the bearings in the metal sleeve to be separately and accurately machined, and the bearings to be force-fitted into the seats of the sleeve after the latter has been secured to the respective end wall of the tub. The construction and manufacture of this tub is thus obviously rather complicated.

It would now in fact be possible to eliminate the shortcomings of these solutions and to achieve a durable mount-

ing of the bearings in a tub if such tub were completely made of a plastic material capable of sustaining the mechanical stresses acting on the bearings.

In this case, however, the tub would have to be made of an excessively expensive material and would therefore be ineconomical for use in a laundry washing machine.

It is therefore an object of the invention to eliminate the shortcomings and limitations of known plastic laundering tubs for laundry washing machines by providing a laundering tub of this type in which the support bearings for the drum shaft are safely retained, excluding any deformation of the material of the tub during rotation of the drum.

These and other objects are attained by a method for making a plastic laundering tub for a laundry washing machine, said tub being adapted to contain a rotatable drum the drive shaft of which is supported by at least two axially spaced bearings positioned in a sleeve passing through a respective end wall of the tub.

According to the invention, this method is characterized in that the sleeve is obtained separately from the tub, preferably by injection-moulding in two successive processing phases of a plastic material having a high resistance against mechanical stresses, namely, a first phase using a first mould for making a spacer element dimensioned to maintain the bearings at a suitable axial spacing, and a second phase in which the spacer element in placed in a second mould together with the bearings, and the plastic material is injection-mpoulded about the spacer element and the bearings for finishing the sleeve, the sleeve being subsequently placed in a third mould in which the tub is obtained preferably by injection-moulding about the sleeve of another plastic material having a lesser resistance against mechanical stresses than the previous one.

The characteristics of the invention will become more clearly evident from the following description, given by

way of example with reference to the accompanying drawings, wherein:

fig. 1 shows an axially sectioned view of a laundering tub according to an embodiment of the invention, and

figs. 2, 3 and 4 show diagrammatical sictional views representing successive phases of the manufacture of the tub according to fig. 1.

With reference to fig. 1, a laundering tub 5 according to the invention is substantially made of a plastic material and comprises a peripheral wall 6 and two opposite end walls 7 and 8, of which end wall 7 is formed with an access opening 9.

The tub is adapted to contain a rotatable drum 10, and is mounted in a conventional manner in the housing (not shown) of a laundry washing machine.

Drum 10 is provided with a drive shaft 11 supported by at least two axially spaced bearings 12 and 13 retained in a sleeve 14 made of a plastic material and passing through a hub portion 15 formed in end wall 8 of tub 5. The tub is made by a manufacturing method involving successive phases as depicted in figs. 2, 3 and 4.

In particular, this method is initially directed to the manufacture of sleeve 14 separately from tub 5, preferably by injection-moulding in two successive processing phases (shown respectively in figs. 2 and 3) of a plastic material having a high resistance against mechanical stresses, for instance glass-fibre reinforced polyester.

For the first processing phase, use is made of a first mould 16 (fig. 2) having a female element 17 and a male element 18 configured to form a spacer element 19 in the shape of a cylindrical sleeve, the function of which to be explained as the description proceeds.

In the subsequent second processing phase, use is made of

a second mould 20 (fig. 3) having a female element 21 and a male element 22 configured to form the sleeve 14 as specified above. More particularly, male element 22 of mould 20 is provided with a lateral cylindrical projection 23 adapted to have bearing 12, spacer element 19 and bearing 13 mounted thereon prior to being inserted into female element 21. After bearing 12, spacer element 19 and bearing 13 have been thus mounted on projection 23, the latter is inserted into female element 21 into compressive engagement therewith of bearing 13 to thereby define an annular cavity between the outer surfaces of bearings 12 and 13 and spacer element 19 and the inner wall surface of female element 21.

A subsequently injected plastic material is thus injection-moulded about bearings 12, 13 and spacer element 19 so as to form the cylindrical wall 25 of sleeve 14 (fig. 1). At the end of this operation, sleeve 14 is placed in a third mould 26 (fig. 4) having a female element 27 and a male element 28 cooperating to define a cavity for injection-moulding tub 5 by the use of another plastic material having a lesser resistance against mechanical stresses than the previous one, for instance polypropylene.

In particular, male element 28 of mould 26 has a lateral cylindrical projection 29 adapted to have sleeve 14 mounted thereon prior to male element 28 being inserted into female element 27. As male element 28 is subsequently inserted into female element 27 preparatory to injection-moulding tub 5, projection 29 maintains sleeve 14 in position between female element 27 and male element 28 adjacent end wall 8 of tub 5 while additionally preventing the plastic material subsequently injected into mould 26 from penetrating into the sleeve itself.

In the closed state of mould 26, female element 27 and male element 28 cooperate to define cavities 30, 31 and 32 communicating with one another for injection-moulding peripheral wall 6, end wall 8 and a peripheral flange for

securing end wa[illegible] to tub 5.

The finished tub is thus made of two different types of plastic material, namely, a more expensive first type having a high resistance against mechanical stresses, only a limited amount of which is employed for injection-moulding the portion supporting the drive shaft of the drum, and a less expensive second type having a lesser resistance against mechanical stresses than the previous one, which is injection-moulded about the plastic material of the first type at a sufficient amount for forming the remainder of the tub. This permits simple injection-moulding techniques to be employed for making a plastic laundering tub provided with a reliable mounting for the drum made of a non-deformable material.

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EP 3049

Method for Making a Laundering Tub for a Laundry Washing machine and Laundering Tub Thus Made

Patent Claims

1. A method for making a plastic laundering tub for a laundry washing machine, said tub being adapted to contain a rotatable drum the drive shaft of which is supported by at least two axially spaced bearings positioned in a sleeve passing through a respective end wall of said tub, characterized in that said sleeve (14) is obtained separately from said tub (5), preferably by injection moulding in two successive processing phases of a plastics material having a high resistance against mechanical stresses, namely, a first phase using a first mould (16) for making a spacer element (19) dimensioned to maintain said bearings (12, 13) at a suitable axial spacing, and a second phase in which said spacer element (19) is placed in a

second mould (20) together with said bearings (12, 13), and the plastics material is injection-moulded about said spacer element (19) and said bearings (12, 13) for finishing said sleeve (14), said sleeve (14) being subsequently placed in a third mould (26) in which said tub (5) is obtained preferably by injection-moulding about said sleeve (14) of another plastics material having a lesser resistance against mechanical stresses than the previous one.

2. A method according to claim 1, characterized in that the male element (22) of said second mould (20) is provided with a lateral cylindrical projection (23) adapted to have said bearings (12, 13) positioned thereon with said spacer element (19) therebetween, the female element (21) of said mould (20) being adapted to compressively engage at least one of said bearings (13).

3. A method according to claim 1, characterized in that the male element (28) of said third mould (26) is provided with a lateral cylindrical projection (29) adapted to have said sleeve (14) mounted thereon between said male element (28) and the female element (27) of said third mould (26) at a position corresponding to said end wall (8) of said tub (5).

4. A plastic laundering tub for a laundry washing machine, obtained by the manufacturing method according to claims 1 - 3, said tub being adapted to contain a rotatable drum the drive shaft of which is supported by at least two axially spaced bearings positioned in a sleeve passing through a respective end wall of said tub, characterized in that said sleeve (14) is made of a plastic material having a high resistance against mechanical stresses, and provided with at least one spacer element (19) interposed between said bearings (12, 13) for maintaining them at axially spaced positions, and that said tub (5) is made of another plastic material injection-moulded about said sleeve (14) and having a lesser

resistance against mechanical stresses than the previous one.

5. A laundering tub according to the preceding claims, substantially as described with reference to the accompanying drawings and for the specified purposes.

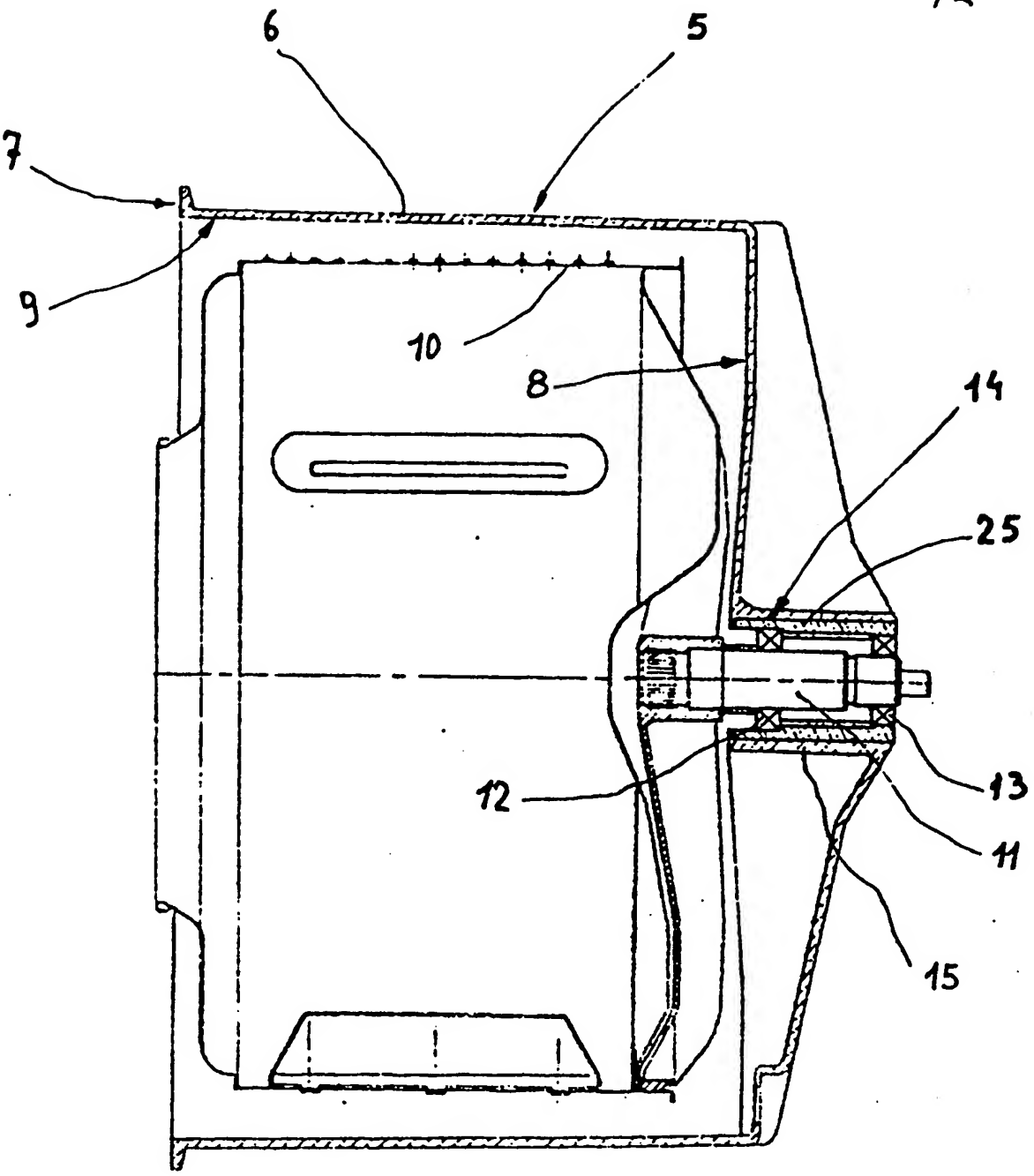

fig. 1

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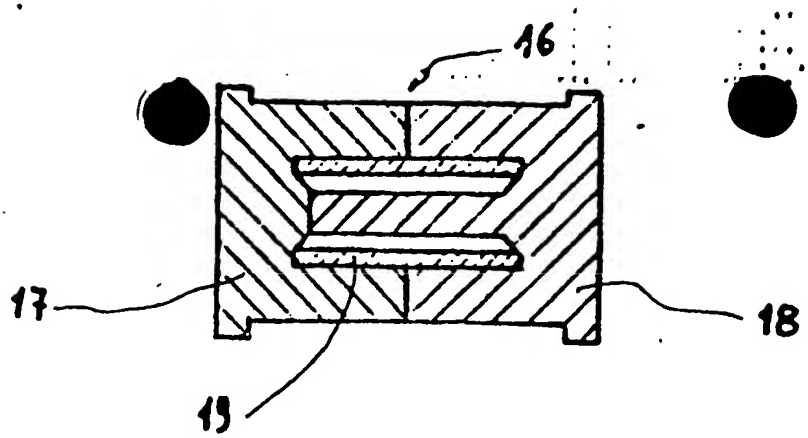

fig. 2

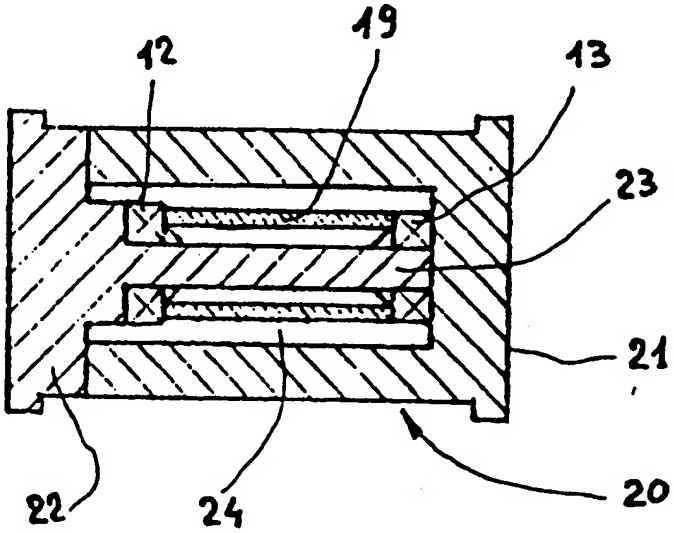

fig. 3

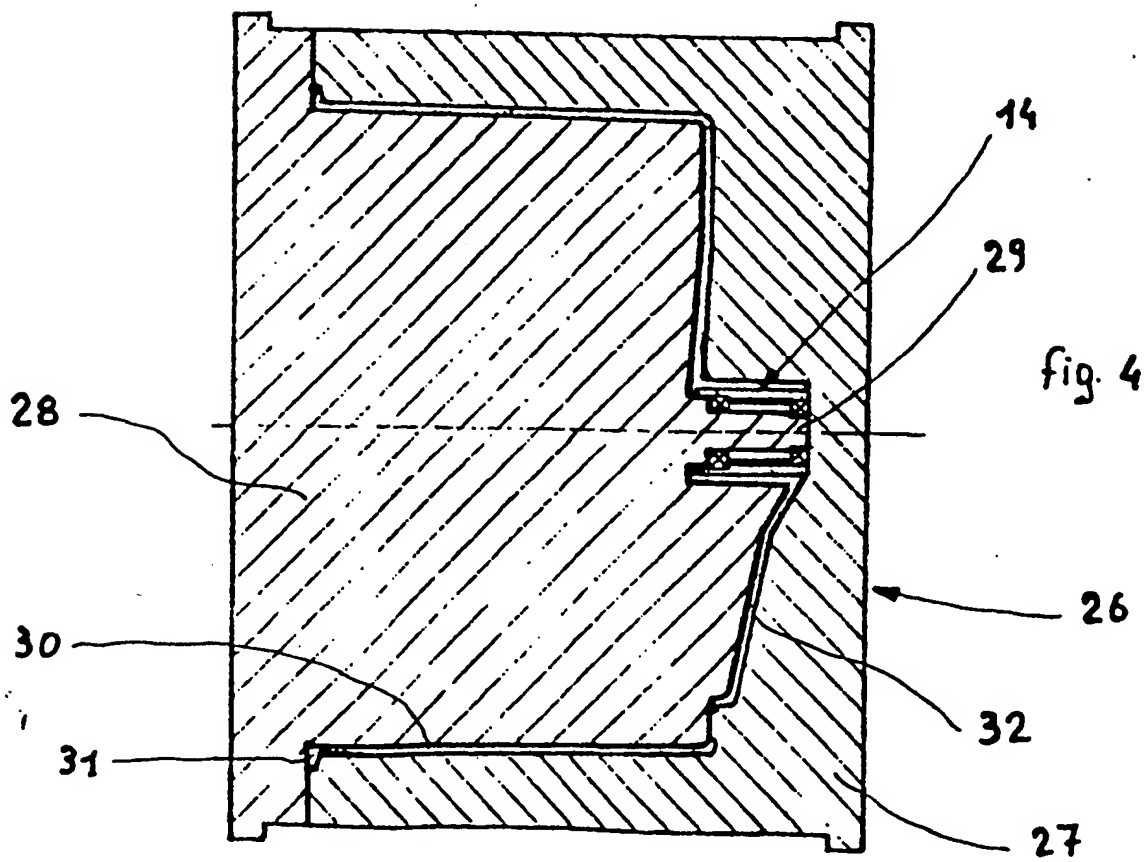

fig. 4